

PATENT CLAIMS

1. Composition for preparing poly(meth)acrylimides
and for producing poly(meth)acrylimide foams,
5 according to Figure 5,

characterized in that

10 methacrylic anhydride and one, or two or more
different, N-methacrylamides [sic] $C_4H_6NOR^1$ accord-
ing to Figure 6, and/or one, or two or more
different, primary amines H_2NR^1 was added to the
composition, where R^1 or R^2 [sic] may be identical
15 or different and are an alkyl or aryl radical
which has up to 36 carbon atoms and in which
oxygen atoms, nitrogen atoms, sulphur atoms, and
phosphorus atoms in the form of organic
functionalities, e.g. an ether function, alcohol
20 function, acid function, ester function, amide
function, imide function, phosphonic acid
function, phosphonic ester, phosphinic acid
function, phosphinic ester function, sulphonic
acid function, sulphonic ester function, sulphonic
25 acid function, sulphonic ester function, silicon
atoms, aluminium atoms and boron atoms, or else
halogens, such as fluorine, chlorine, bromine or
iodine may also be present, R^1 and R^2 may be the
methyl group, the ethyl group, the n-propyl group,
2-propyl group, n-butyl group, 2-butyl group,
30 3-methyl-2-butyl group, tert-butyl group, the
isomers of the propyl, hexyl, heptyl group, the
isomers of the octyl group, e.g. the 2-ethylhexyl
group, the lauryl group, stearyl group, the phenyl
group, benzyl group, alkylphenyl group,
35 alkylbenzyl group, $R^3-PO(OR^3)_2$ group, where R^3 is
an alkyl or aryl radical having up to 20 carbon
atoms.

2. Composition according to Claim 1, characterized in

that the composition comprises a blowing agent which is preferably an aliphatic alcohol having from 3 to 8 carbon atoms, urea, monomethyl- and/or N,N'-dimethylurea and/or formamide and/or water.

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3. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

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(A) from 0.7 to 1.3 molar parts of one or more primary amines H_2NR^1 , where R^1 is as described above,

from 0.7 to 1.3 molar parts of methacrylic anhydride;

(B) from 0.3 to 2.0 molar parts of methacrylonitrile,

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from 0.7 to 2.5 molar parts of methacrylic acid and

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from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

(C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

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(D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

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(E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

4. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

5 (A) from 0.7 to 1.3 molar parts of one or more primary amines H_2NR^1 , where R^1 is as described above,

from 1.4 to 2.6 molar parts of methacrylic anhydride,

10 from 1.4 to 2.6 molar parts of methacrylonitrile;

(B) from 0.3 to 2.0 molar parts of methacrylonitrile,

from 0.7 to 2.5 molar parts of methacrylic acid and

15 from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

20 (C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

25 (D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

(E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

30 is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

5. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

- 5 (A) from 10^{-7} to 1.3 molar parts of one or more N-methacrylamides [sic] $C_4H_6NOR^1$ according to Figure 6, where R^1 is as described above,
- from 0.7 to 1.3 molar parts of methacrylic anhydride,
- 10 from 10^{-7} to 1.3 molar parts of methacrylonitrile, where the total of the molar parts of methacrylonitrile and of the N-methacrylamide is from 0.7 to 1.3 molar parts;
- 15 (B) from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;
- 20 (C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;
- (D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;
- 25 (E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

30 is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

6. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

(A) from 0.7 to 1.3 molar parts of one or more N-methacrylamides [sic] $C_4H_6NOR^1$ according to Figure 6, where R^1 is as described above,

5 from 0.7 to 1.3 molar parts of methacrylic anhydride,

from 0.7 to 1.3 molar parts of methacrylonitrile;

10 (B) from 0.3 to 2.0 molar parts of methacrylonitrile,

from 0.7 to 2.5 molar parts of methacrylic acid and

15 from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;

(C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;

20 (D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;

25 (E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

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7. Process for producing a polymethacrylimide foam, characterized in that a mixture composed of

- (A) from 0 to 2.6 molar parts of one or more primary amines H_2NR^1 , where R^1 is as described above,
- 5 from 0 to 5.2 molar parts of one or more N-methacrylamides [sic] $C_4H_6NOR^1$ according to Figure 6, where R^1 is as described above,
- 10 from >0 to 6.5 molar parts of methacrylic anhydride,
- from 0 to 3.9 molar parts of methacrylonitrile and
- from 0 to 1.3 molar parts of methacrylic acid;
- 15 (B) from 0.3 to 2.0 molar parts of methacrylonitrile,
- from 0.7 to 2.5 molar parts of methacrylic acid and
- 20 from 0 to 0.2 molar part of other monomers having vinyl unsaturation, where the ratio of the total of the molar parts of (B) and (A) is $(B)/(A) =$ from 0 to 1 million;
- (C) from 0.5 to 15 per cent by weight, based on the total of the weights of components (A) and (B), of a blowing agent;
- 25 (D) from 0.01 to 0.5 per cent by weight, based on the total of the weights of components (A) and (B), of one or more polymerization initiators;
- 30 (E) from 0 to 200 per cent by weight, based on the total of the weights of components (A) and (B), of conventional additives

is polymerized to give a sheet, and then this polymer sheet is foamed at temperatures of from 150 to 250°C.

- 5 8. Process according to any of Claims 3 to 7,
characterized in that the blowing agent used
comprises an aliphatic alcohol having from 3 to
8 carbon atoms, urea, monomethyl- and/or
N,N'-dimethylurea and/or formamide and/or water.
- 10 9. Laminate comprising a layer of a poly(meth)acryl-
imide foam according to any of Claims 1 to 8.
- 15 10. Automobile characterized in that it is composed
entirely or partially of a poly(meth)acrylimide
foam according to at least one of the preceding
claims.
- 20 11. Rail vehicle characterized in that it is composed
entirely or partially of a poly(meth)acrylimide
foam according to at least one of the preceding
claims.
- 25 12. Watercraft characterized in that it is composed
entirely or partially of a poly(meth)acrylimide
foam according to at least one of the preceding
claims.
- 30 13. Rotor characterized in that it is composed
entirely or partially of a poly(meth)acrylimide
foam according to at least one of the preceding
claims.